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Review of the concept of the "launching State"

Report of the Secretariat

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I. Introduction

1. An item entitled "Review of the concept of the 'launching State'" was included in the agenda of the Legal Subcommittee under the following three-year work plan, from the Subcommittee's thirty-ninth session in 2000 to its forty-first session in 2002:

2000 Special presentations on new launch systems and ventures

2001 Review of the concept of the "launching State" as contained in the Convention on International Liability for Damage Caused by Space Objects (General Assembly resolution 2777 (XXVI), annex, the "Liability Convention") and the Convention on Registration of Objects Launched into Outer Space (resolution 3235 (XXIX), annex, the "Registration Convention") as applied by States and international organizations.

2002 Review of measures to increase adherence to those Conventions and to promote their full application

2. At its fortieth session, in 2001, the Legal Subcommittee requested the Secretariat to prepare for it at its forty-first session a document that would contain the following (A/AC.105/763, annex II, para. 4):

(a) A synthesis of state practice in applying the concept of the "launching State";

(b) Questions regarding the application of the concept of the "launching State" arising from state practice and from new developments in space activities;

(c) Elements that could be included in national space legislation and licensing regimes

The document would synthesize information contained in documents before the Subcommittee under the agenda item at its thirty-ninth and fortieth sessions. The Working Group invited Member States and international organizations to convey to the Secretariat any additional information on state practice, including practice in States that did not currently have national space laws, for possible inclusion in the synthesis (A/AC.105/763, annex II, para. 5).

3. The present document has been prepared for the Legal Subcommittee at its forty-first session, in response to the above request. The document synthesizes information presented during consideration of the agenda item on review of the concept of the "launching State". It does not contain or constitute an authoritative interpretation of the concept of the "launching State". Examples of state practice, such as provisions from national laws and international agreements, are illustrative rather than comprehensive.

II. Synthesis of state practice in applying the concept of the "launching State"

A. Background on provisions of the Liability and Registration Conventions

4. Article I of the Liability Convention and the Registration Convention each contains the following, identical definition of the launching State:

> "(i) A State which launches or procures the launching of a space object;
>
> "(ii) A State from whose territory or facility a space object is launched."

Article I of each Convention also adds that the term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof. Under the Liability Convention, the term "launching" includes attempted launching.

5. Under the Liability Convention, a launching State is absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight (art. II). Whenever two or more States jointly launch a space object, they are jointly and severally liable for any damage caused (art. V). A system of fault-based liability applies to damage caused elsewhere than on the surface of the Earth (arts. III and IV).

6. Under the Registration Convention, when a space object is launched into Earth orbit or beyond, the launching State shall register the space object by

means of an entry in an appropriate registry which it shall maintain (art. II). Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object (art. II). The launching State on whose registry a space object is carried is called the "State of registry" and is required to furnish certain information about the space object to the Secretary-General of the United Nations (art. IV). States may also furnish information to the Secretary-General pursuant to General Assembly resolution 1721 (XVI) B of 20 December 1961, in which the Assembly calls upon States launching objects into orbit or beyond to furnish information promptly to the Committee on the Peaceful Uses of Outer Space, through the Secretary-General, for the registration of launchings, and requests the Secretary-General to maintain a public registry of that information. Under article VIII of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (resolution 2222 (XXI), annex, the "Outer Space Treaty"), a State Party on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.

7. Concepts in other United Nations legal instruments on outer space may be relevant to the concept of the "launching State". These may include the concepts of "international responsibility for national activities" and "authorization and continuing supervision by the appropriate State Party" under article VI of the Outer Space Treaty; and the concept of the "launching authority" under the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (resolution 2345 (XXII), annex, the "Rescue Agreement").

8. The Principles Relevant to the Use of Nuclear Power Sources in Outer Space (see resolution 47/68) also use the term "launching State", which in principle 2, paragraph 1, is defined as "the State which exercises jurisdiction and control over a space object with nuclear power sources on board at a given point in time relevant to the principle concerned" (except with respect to principle 9, in which the definition in the Liability and Registration Conventions is used).

B. Launch systems and ventures

9. One continuing trend is an increasing number of countries that carry out launch activities and other space activities, including both developed and developing countries.

10. Another trend is an increasing degree of international cooperation in space missions. One example is the International Space Station, which involves resource-sharing and technological cooperation between 16 countries and is manned by international teams of space explorers.

11. Private-sector launch activities are increasing in number and variety and many are multinational in composition and offer services from more than one launch site. This, together with a parallel decline in government funding for space programmes, reflects overall economic trends.[1]

12. Multinational private partnerships may be classified into three major categories of launch interest (although some partnerships may involve more than one category):

(a) Technology partnerships, formed to produce or assemble launch vehicles and their components as well as launch equipment and facilities;

(b) Marketing partnerships, designed to expand the reach of various launch vehicles to global markets;

(c) Provider/customer partnerships, involving the teaming of launch service providers with companies who use their launch services in various efforts to bring mutual benefits to themselves or their customers.[2]

13. Examples of multinational private enterprises involved in launch activities, discussed during consideration of the agenda item entitled "Review of the concept of the 'launching State'", include (a) Starsem, a French-Russian partnership that markets and manages Soyuz launches from the Baikonur Cosmodrome in Kazakhstan; (b) Eurockot, a new German-Russian commercial launch service provider; and (c) SeaLaunch, a consortium of private companies from Norway, the Russian Federation, Ukraine and the United States of America, which carries out launches from a converted oil platform (registered with Liberia) on the high seas.

14. A variety of launch vehicles are currently in service that include modular launch vehicles, air-to-space launch vehicles, reusable launch vehicles and launch vehicles based on intercontinental ballistic missiles (see A/AC.105/736, para. 90).

15. It is common for a single launch to place more than one satellite in orbit. For instance, small satellites can be launched at reduced cost by "piggybacking" on the launch of a larger satellite. Satellites have been launched together with human crews on the United States Space Shuttle and the satellites are deployed when the Space Shuttle is in orbit.

C. Definition of "space activities"

16. Under article VI of the Outer Space Treaty, States parties bear international responsibility for national activities in outer space and the activities of non-governmental entities in outer space require authorization and continuing supervision by the appropriate State party to the treaty. Most national space laws apply to "space activities" or "activities in outer space", often listing a few specific types of space activity that fall within the scope of the law. The launching of objects into outer space, and sometimes also attempted launch, is explicitly listed as a type of space activity under some national laws and is probably implicitly covered by most others. Some national laws, such as the Australian and United States laws, explicitly cover the re-entry of space objects; again, this may be covered implicitly by other national laws. Other activities explicitly listed within the definition of space activities in at least one national law include operation of a launch site or re-entry site, activities entirely within outer space, space research, design and application of space technology and operation of a space object. Examples of provisions governing the subject matter covered by national space laws include the following:

(a) The Australian Space Activities Act, among other things, requires authorization for the launch (including attempted launch) of a space object into outer space, the return (including attempted return) of a space object from outer space to Earth or the operation of a launch facility. "Launch facility" is defined under the Act as a facility (whether fixed or mobile) or place specifically designed or constructed as a facility or place from which space objects can be launched and includes all other facilities at the facility or place that are necessary to conduct a launch;[3]

(b) The Russian Federation Law on Space Activity states that licensing requirements apply to space activity for scientific and socio-economic purposes where such activity includes the testing, manufacture, storage, preparation for launch or launch of space objects or control of space flights.[4] The Law defines space activity more generally as any activity directly connected with operations to explore and use outer space, including the Moon and other celestial bodies. According to the Law, the main areas of space activity include scientific space research; use of space technology for communications, including television and radio broadcasting; remote sensing of the Earth from outer space, including environmental monitoring and meteorology; use of navigation, topographic and geodesic satellite systems; manned space missions; use of space technology, materials and techniques for the purposes of the defence and security of the Russian Federation; observation of objects and phenomena in outer space; testing of technology in outer space conditions; manufacturing of materials and other products in outer space; and other types of activity performed with the aid of space technology. Space activity also comprises the development (including the design, manufacturing and testing) and use (operation) of space technology, materials and techniques and the provision of other space-related services, as well as international cooperation undertaken by the Russian Federation in the exploration and use of outer space;[5]

(c) The South African Space Affairs Act requires a licence for launching, operation of a launch facility and various other space activities specified by the Act or prescribed by the Minister of Trade and Industry. "Launching" means the placing or attempted placing of any spacecraft into a sub-orbital trajectory or into outer space or the testing of a launch vehicle or spacecraft in which it is foreseen that the launch vehicle will lift from the Earth's surface. "Space activities" mean the activities directly contributing to the launching of spacecraft and the operation of such craft in outer space;[6]

(d) The Swedish Act on Space Activities applies to activities in outer space (space activities). In addition to activities carried out entirely in outer space, also included in space activities are the launching of objects into outer space and all measures to manoeuvre

or in any other way affect objects launched into outer space. Merely receiving signals or information in some other form from objects in outer space is not designated space activity according to the Act, nor is launching of sounding rockets;[7]

(e) Under Ukrainian law, "space activity", which requires a licence from the Ukrainian National Space Agency, is defined as scientific space research, the design and application of space technology and the use of outer space;[8]

(f) The Outer Space Act of the United Kingdom of Great Britain and Northern Ireland applies to (a) launching or procuring the launch of a space object; (b) operating a space object; and (c) any activity in outer space.[9] Under the Act, a person carries on an activity if he causes it to occur or is responsible for its continuing.[10] The British National Space Centre has so far taken the view that the leasing of space segment satellite capacity (transponders) and the use of such capacity using ground stations for either transmission or reception, other than telemetry, tracking and control of satellites, does not constitute activity in outer space;

(g) United States requirements for licensing or other authorization of non-governmental activities related to outer space are contained in a number of separate legislative instruments covering, for example, launch and re-entry of space objects, telecommunications and satellite remote sensing. A licence is required in the United States for certain persons to launch a launch vehicle or to operate a launch site or re-entry site or to re-enter a re-entry vehicle.[11] "Launch" means to place or try to place a launch vehicle or re-entry vehicle and any payload from Earth: (a) in a sub-orbital trajectory; (b) in Earth orbit in outer space; or (c) otherwise in outer space, including activities involved in the preparation of a launch vehicle or payload for launch, when those activities take place at a launch site in the United States. "Launch vehicle" means (a) a vehicle built to operate in, or place a payload in, outer space; and (b) a sub-orbital rocket. "Re-entry vehicle" means a vehicle designed to return from Earth orbit or outer space to Earth or a reusable launch vehicle designed to return from Earth orbit or outer space to Earth, substantially intact. "Launch site" means the location on Earth from which a launch takes place (as defined in a licence issued or transferred by the Secretary of Transportation)[12] and necessary facilities at that location. "Re-entry site" means the location on Earth to which a re-entry vehicle is intended to return (as defined in a licence issued or transferred by the Secretary of Transportation).[13] Regulations under the Communications Act of 1934 (as amended) state that no person shall use or operate apparatus for the transmission of energy or communications or signals by space or Earth stations except under, and in accordance with, an appropriate authorization granted by the Federal Communications Commission.[14] Under the Land Remote Sensing Policy Act of 1992 (as amended, inter alia, by the Commercial Space Act of 1998), private persons require a licence to operate any private remote sensing space system.[15]

D. Jurisdiction over space activities

17. The jurisdictional scope of national space laws may be relevant to state practice regarding the "concept of the launching State", if the State in question considers that certain activities could make the state a "launching State" and therefore specifies the persons or activities covered by the State's national licensing regimes. Also relevant are provisions of international agreements that specify which activities are supervised or controlled by the various parties to the agreement.

18. Most space launch licensing regimes require authorization for space activities carried out from national territory.[16]

19. Most regimes also require authorization for certain launches outside national territory in which the country's nationals are involved. "Nationals" may be defined in a variety of ways, but normally include citizens of the country in question and organizations established or incorporated under the laws of the country in question. National space laws normally apply to non-governmental organizations, but may also apply to governmental organizations. Examples of provisions defining the jurisdictional scope of national space laws include the following:

(a) Under the Australian Space Activities Act, an "Australian national" means (a) an Australian citizen, (b) a body incorporated by or under a law of the Commonwealth, of a state or of a territory, or (c) the Commonwealth, a state or a territory.[17]

Australian nationals require an overseas launch certificate for overseas launches or returns if they carry out the launch or return, if they own all or some of any payload forming part of the space object concerned during the relevant "liability period" or under other conditions specified by regulations.[18] If another country is also a launching State for a particular space object or objects, the minister, when deciding whether to grant a launch permit or overseas launch certificate, may have regard to whether there is an agreement between Australia and that other country under which that country assumes any liability, and indemnifies Australia, for any damage that the space object or objects may cause, and if so, the terms of that agreement;[19]

(b) Licensing requirements of the Russian Federation apply to space activity pursued by organizations and citizens of the Russian Federation or to the space activity pursued by foreign organizations and citizens under the jurisdiction of the Russian Federation;[20]

(c) South Africa requires a licence for launches from the territory of another State by or on behalf of a juristic person incorporated or registered in the Republic;[21]

(d) Swedish natural or juridical persons may not carry out space activities outside Swedish territory without a licence;[22]

(e) Any space facility engaging or intending to engage in space activities under the jurisdiction of Ukraine outside its borders shall be required to have a licence;[23]

(f) The United Kingdom Outer Space Act applies to United Kingdom nationals, Scottish firms and bodies incorporated under the law of any part of the United Kingdom;[24]

(g) The United States requires a licence for launches and related activities by (a) individuals who are citizens of the United States and (b) entities organized or existing under the laws of the United States or a state; in addition, the United States requires a licence for (c) entities organized or existing under the laws of a foreign country if the controlling interest (as defined by the Secretary of Transportation) is held by an individual who is a citizen of the United States or an entity organized or existing under the laws of the United States or a state.[25] For activities in the territory of a foreign country, a licence is required for entities in category (c) if the United States Government and the Government of the foreign country agree that the United States has jurisdiction over the launch. For activities outside the territory of any country, a licence is required for entities in category (c) unless the United States Government and the Government of a foreign country agree that the foreign country has jurisdiction over the launch.[26]

20. States may conclude international agreements that specify which of them will exercise jurisdiction and control over various space activities. As can be seen from the previous paragraph, that possibility may be anticipated within the national space law. Examples of relevant provisions in international agreements include the following:

(a) Under the International Space Station Agreement, each partner retains jurisdiction and control over the elements it registers in accordance with article II of the Registration Convention, above and over personnel in or on the Space Station who are its nationals, and subject to any agreements to the contrary.[27] Canada, the European partner States, Japan, the Russian Federation and the United States may exercise criminal jurisdiction over personnel in or on any flight element who are their respective nationals. There is also provision for criminal jurisdiction of an affected partner State in some cases in which the misconduct (a) affects the life or safety of a national of another partner State, or (b) occurs in or on or causes damage to the flight element of another partner State;[28]

(b) A 1999 agreement between Kazakhstan, the Russian Federation and the United States establishes a procedure for technology safeguards associated with launches by the Russian Federation of United States-licensed spacecraft from the Baikonur Cosmodrome in Kazakhstan. Among other things, the parties are required to take all necessary measures to ensure that United States participants retain control of spacecraft, United States-related equipment and United States technical data, unless otherwise authorized by the United States Government and to ensure that Russian representatives retain control of launch vehicles, launch pads and technical complexes, Russian-related equipment and Russian technical data, unless otherwise authorized by the Russian Government. The parties are also required to ensure that only those United States participants whose authority to apply security

procedures has been approved by the United States Government shall control access to spacecraft, United States-related equipment and United States technical data. "United States participants" includes persons who, in connection with a United States export licence, participate in launch activities and are under the jurisdiction and/or control of the United States. "Russian representatives" includes any persons other than Kazakh representatives or United States participants who have or could have access to spacecraft, United States-related equipment and/or United States technical data who are subject to the jurisdiction and/or control of the Russian Federation.[29]

E. Ensuring the safety of space activities to human health, property and the environment

21. Measures to ensure the safety of space activity are relevant to the concept of the launching State since they may reduce the damage a State is liable for under the Liability Convention. Ensuring the safety of space activities is an important policy behind most national space laws, in particular laws governing the launch of objects into outer space. Most launch licensing regimes include measures to ensure that the launch does not create a significant risk of personal injury, environmental damage or damage to property. Environmental standards may include measures to protect the space environment, including debris mitigation requirements or measures to prevent frequency interference with astronomy or light pollution.

22. Ensuring the safety of space activity may be part of a national licensing regime that may implement the requirement for "authorization and continuing supervision" of the activities of non-governmental entities in outer space under article VI of the Outer Space Treaty. The licensing regime may involve not only space-related institutions but also government institutions working in fields such as environmental protection. In addition to environmental and safety standards, licensing regimes often include other requirements that may be relevant to the concept of the launching State, such as a requirement that space activities be consistent with a country's national interest, international obligations and foreign policy.[30] Some countries recover licensing costs from the applicant by charging an application fee.[31] In addition, some national laws make provision for appointment of government officials to oversee the safety of launch operations or more general compliance with conditions of the licence. Some national space laws also provide for public notification in the case of an accident or emergency. Examples of provisions of national laws and international agreements to ensure the safety of space activities include the following:

(a) Conditions of a space licence (to operate a launch facility and particular type of launch vehicle) or launch permit in Australia include the following: (a) competency to operate the launch facility and particular type of launch vehicle (in the case of a space licence) or to carry out the launch (in the case of a launch permit) and (b) sufficiently low probability of substantial harm to public health or safety or substantial damage to property.[32] Requirements for a space licence include obtaining necessary environmental approvals and construction of an environmental plan and cooperation with the designated launch safety officer (see below).[33] Requirements for a launch permit include (a) the space object does not contain a nuclear weapon or other weapon of mass destruction and (b) the space object must not contain fissionable material without prior written approval from the relevant minister.[34] In addition to review of these conditions by the relevant minister during the application for authorization to launch, Australian law also provides for the appointment of a launch safety officer for each licensed launch facility. The launch safety officer is responsible for ensuring that any required notices are given of launches at the facility, that no person or property is endangered by any launch conducted at the facility, and that all conditions of space licences and launch permits are fully complied with. The launch safety officers are granted certain powers, for instance, certain powers of inspection and seizure, in order to carry out their functions.[35] More detailed safety procedures are specified in the Australian Space Activities Regulations 2001;[36]

(b) Article 22 of the Russian Federation's Law on Space Activity provides that all space activity shall comply with the safety requirements established by the laws and other normative legislative acts of the Russian Federation and that space activity shall be performed with due reference to the permissible level of man-made contamination of the environment and

circumterrestrial space. In the event of a threat arising to public safety or to the environment, the federal executive body responsible for space activity and the federal executive defence body shall immediately notify the competent state governmental authorities accordingly, as well as organizations and citizens.[37] One requirement for obtaining a licence for space operations in the Russian Federation is the submission of documents confirming the safety of space operations (including ecological, fire and explosion safety) and the reliability of space equipment.[38] The Law also contains provisions for search and rescue and clean-up;[39]

(c) The South African Space Affairs Act of 1993 states that a licence shall be issued for launching and other related activities subject to such conditions as the South African Council for Space Affairs may determine for that particular licence, taking into account, among other things, the minimum safety standards as determined by the Council.[40] The Act also makes provision for the Council to appoint "inspectors" and may instruct inspectors to be present at any activity to which a licence applies, in order to ascertain whether the conditions of the licence are being complied with, and to report immediately to the Council any situation or activity that in the opinion of the inspector poses an unacceptable safety risk.[41] The minister may, subject to the provisions of any other law, establish regulations regarding safety measures and minimum safety standards concerning any space or space-related activity;[42]

(d) Under Ukrainian law, presenting a direct threat to the life and health of human beings and causing damage to the environment is prohibited in connection with space activity. Space activity conducted under a specific project that has led to the loss of human lives, substantial material damage or substantial damage to the environment may be restricted or prohibited.[43] Subjects of space activity must comply with safety requirements with regard to the life and health of the public, the property of citizens, enterprises, institutions and organizations and protection of the environment. They are also required to ensure that the necessary measures are taken to prevent environmental damage as the result of space activity, in accordance with Ukrainian legislation currently in force. State supervision of compliance with safety requirements is the responsibility of the Ukrainian National Space Agency, the Ministry of Defence of Ukraine and other executive authorities within their competence.[44] There are also procedures for notifying the Government about events that have, among other things, created a threat to the life and health of persons or damage to property or have caused death or serious bodily injury;[45]

(e) Under United Kingdom law, the Secretary of State may not grant a licence for space activity unless the activity will not jeopardize the public health or the safety of persons or property.[46] A licence may contain conditions requiring the licensee to conduct operations so as to prevent contamination of outer space or adverse changes in the Earth's environment and permitting inspection by the Secretary of State of the licensee's facilities and inspection and testing of the licensee's equipment.[47] The British National Space Centre carries out a technical safety assessment, which involves assessing the ability of the satellite system to comply with safety criteria, including plans to reorbit or deorbit the satellite;

(f) In the United States, decisions of the Secretary of Transportation to issue or transfer a licence for launch or reorbiting activities must be consistent with public health and safety and the safety of property. The Secretary of Transportation may establish procedures for safety approvals of launch vehicles, re-entry vehicles, safety systems, processes, services or personnel that may be used in conducting licensed commercial space launch or re-entry activities.[48] A licensee is required to allow the Secretary of Transportation to place an officer or employee of the United States Government or another individual as an observer at facilities such as launch sites or re-entry sites, to monitor the activity of the licensee or contractor to ensure compliance with the licence or ensure that the launch or re-entry does not jeopardize public health and safety and the safety of property;[49]

(g) Safety rules applicable to the Guiana Space Centre governing in-flight and ground safety are drawn up by the Centre national d'études spatiales (CNES) of France and were last issued on 15 December 1997. They set out safety requirements and procedures to be observed by all users of the Ariane launch base. Administrative provisions applicable to the French Guiana department include environmental protection rules;

(h) Art. 10 of the International Space Station Agreement states that the partners, acting through their cooperating agencies, shall have responsibilities in the operation of the elements they respectively provide. The partners are required to develop and implement procedures for operating the Space Station in a manner that is safe, efficient and effective for Space Station users and operators.

23. Most national laws provide that licences may be suspended or revoked in certain cases, normally including breach of a licence condition.[50] Breaching a condition of a licence may also lead to civil or criminal penalties under national laws.[51] The International Space Station Agreement provides for criminal jurisdiction of partner States over personnel in or on any flight element who are their respective nationals. In a case involving misconduct on orbit that (a) affects the life or safety of a national of another partner State or (b) occurs in or on or causes damage to the flight element of another partner State, the partner State whose national is the alleged perpetrator shall, at the request of any affected partner State, consult with such State concerning their respective prosecutorial interests.[52]

F. Liability, including third-party insurance and financial responsibility requirements

24. Some national space laws contain specific rules governing liability for damage caused by space objects;[53] general laws such as tort or environmental laws may also apply to space activities but are not discussed in the present synthesis. National space laws may also include specific provisions relating to investigation of launch accidents.[54]

25. In addition to ensuring that compensation is due to the victims of damage caused by a launch, many national laws also contain provisions to ensure that such compensation can actually be paid. This type of requirement may protect not only the victim, but also the national Government, ensuring that it can recover damages for which it is liable under the Liability Convention from the entity carrying out the launch. In particular, national licensing regimes may require persons carrying out space launches to obtain insurance to cover possible third-party damage caused by the launch or otherwise to demonstrate that they would have sufficient funds to compensate victims. Examples include:

(a) Australian law imposes insurance/financial requirements as a condition of a launch permit (for launches from Australia) and, in some cases, for an overseas launch certificate (for launches outside Australia).[55] The holder of the authorization or permit must either obtain sufficient insurance or demonstrate direct financial responsibility for the launch.[56] Insurance must cover the permit holder (for launches from Australia only) and the Government of Australia for third-party liability to the extent of maximum probable loss for damage to third parties, or using another method if so provided by regulations;[57]

(b) Japanese law prohibits the National Space Development Agency (NASDA) from launching an artificial satellite unless it has entered into an insurance contract by which it can secure such amount as is necessary to compensate for damage incurred by others as a result of the launch. The amount secured under the insurance contract is determined by the competent ministers and should be appropriate from the viewpoint of the victims and so on, taking into account the amount that insurers can underwrite and other factors. For a "consigned launch", the insurance contract may be entered into by a person or entity that has consigned the launch of the artificial satellite on behalf of NASDA;[58]

(c) Under Russian law, organizations and citizens who use (operate) space technology or who place orders for the design and use (operation) of space technology are required to take out compulsory insurance coverage for the life and health of cosmonauts and personnel of space infrastructure facilities and shall also bear liability for damage causing death or injury of other persons or damage to their property in accordance with the procedures and conditions established by law.[59] In addition, the Russian Space Agency has the right to require that a licensee at the time of readying for launch be able to produce a certificate of conformity of the space facilities and insurance policy to the mandatory insurance of space operations in accordance with the legislation of the Russian Federation;[60]

(d) A licence to conduct launches and related activities in South Africa may contain conditions relating to the liability of the licensee for damage and security to be given by the licensee for such damage

and the manner in which it shall be given, as well as liability of the licensee resulting from international conventions, treaties and agreements entered into or ratified by the Government. Conditions, for instance, may determine, limit or exclude the liability of the licensee regarding damage that may be caused (whether or not the licensee is at fault) by a launch vehicle or spacecraft or by anything being done from or originating from a launch vehicle or spacecraft, may require the licensee to give security to the satisfaction of the South African Council for Space Affairs to meet the obligations that may be incurred by the licensee and may relate to the circumstances in which such security shall be given in order to meet possible claims against the licensee regarding such damage;[61]

(e) The Ukrainian Ordinance on Space Activities states that the list of types of compulsory insurance to be taken out in connection with the pursuit of space activity shall be established by the Ukrainian legislation currently in force. Procedures for compulsory insurance are established by the Cabinet of Ministers of Ukraine. Liability for damage sustained in the course of space activity, as well as procedures for determining the extent of such damage for which compensation shall be payable, is established in conformity with the Ukrainian legislation currently in force;[62]

(f) In the United Kingdom, a licence for space activities may contain conditions requiring the licensee to insure himself against liability incurred in respect of damage or loss suffered by third parties, in the United Kingdom or elsewhere, as a result of the activities authorized by the licence.[63] Among other things, grant of a licence is conditional upon the applicant demonstrating that it can obtain third-party liability cover of £100 million, which is designed to cover reasonable risks;

(g) When a United States launch or re-entry licence is issued, the licensee must obtain liability insurance or demonstrate financial responsibility in amounts to compensate for the maximum probable loss from claims by (a) a third party for death, bodily injury or property damage or loss resulting from an activity carried out under the licence, and (b) the United States Government against a person for damage or loss to government property resulting from an activity carried out under the licence. The amounts required to compensate for maximum probable loss are determined in the case of each licence by the Office of Commercial Space Transportation, up to a maximum of $500 million for death, bodily injury or property damage to third parties and a maximum of $100 million for loss of government property or (if lower) the maximum liability insurance available at reasonable cost on the world market.[64] United States insurance determination requirements covering various launches, launch vehicles, sub-orbital launch vehicles and launch operators, as at 29 July 1999, were distributed at the 2000 session of the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space.

26. The risks associated with insuring launch activities are frequently not only assumed by a primary insurer but also spread among one or more reinsurers. Nevertheless, as anticipated by some of the national laws described above, the desired level of coverage may not always be available. For this and other reasons, some national laws contain measures for payment of claims exceeding liability insurance amounts, as described in the following section.

G. Measures for indemnifying the Government and government payment of claims exceeding liability insurance amounts

27. Liability under the Liability Convention applies to launching States. Some national laws contain provisions requiring non-governmental entities to compensate the State for damages paid by it. Nevertheless, many national laws limit the indemnification to a certain maximum amount, which may be the same as the maximum liability insurance requirement. Under some national laws, that maximum amount may not apply in cases where the non-governmental entity caused the damage wilfully or in some cases negligently. Examples of provisions for indemnifying the Government and government payment of claims exceeding liability insurance amounts include:

(a) Under Australian law, a responsible party for damage caused by a launch is only responsible to pay compensation up to the insured amount. Similarly, if the Government of Australia is liable for damage under the Liability Convention, the responsible party is required to compensate the Government only up to the

amount of required insurance. However, those limitations apply only if (a) the launch was authorized by a launch permit or overseas launch certificate and (b) the damage did not result from a breach of any of the conditions of the permit or certificate, any conduct (whether by act or omission) that the responsible party or a related party engaged in with intent to cause the damage or from the gross negligence of the responsible party or a related party;[65]

(b) Under Japanese law, NASDA may, upon approval of the competent ministers, enter into an arrangement by which it may assume liability for compensation for damage caused by the "consigned launch" (carried out by a non-governmental entity), although NASDA has the right to be reimbursed for damage caused by any persons or entities related to a consigned launch if the persons or entities caused the damage through wilful misconduct. Should NASDA assume liability for a consigned launch, the mandatory insurance coverage for the launch must be taken out by the consignor (non-governmental entity) for and on behalf of NASDA;[66]

(c) Under the Russian Law on Space Activity, compensation for personal injury or damage to the property of a citizen or damage to the property of a corporate entity caused by a space object of the Russian Federation in the course of space activity within the territory of or outside the Russian Federation shall be payable by the organization or citizen that has taken out insurance to cover its liability for damage, in the amount and in accordance with the procedures established by the Civil Code of the Russian Federation;[67]

(d) A licence issued under the South African Space Affairs Act may contain conditions relating to the liability of the licensee resulting from international conventions, treaties and agreements entered into or ratified by the Government.[68] These may include provisions that limit or exclude the liability of the licensee regarding damage that may be caused by a launch vehicle or spacecraft, whether or not the licensee is at fault;[69]

(e) Under the Swedish Act on Space Activities, if the Swedish State is liable for damage as a result of space activities carried on by persons, those persons shall reimburse the State unless there is a special reason for them not to;[70]

(f) The United Kingdom Outer Space Act states that a person to whom the Act applies must indemnify the Government against any claims brought against the Government in respect of damage or loss arising out of activities carried on by that person to which the Act applies, although the section does not apply to a person acting as an employee or agent of another or to damage or loss resulting from anything done on the instructions of the Secretary of State.[71] Grant of a licence is made conditional upon the applicant demonstrating that it can underwrite/guarantee the indemnification obligation by third-party liability cover of £100 million, which is designed to cover reasonable risks. Meeting the insurance requirement does not derogate from the licensee's obligations under article 10 of the Act;

(g) In the United States, holders of space licences are required to obtain liability insurance or demonstrate financial responsibility to cover maximum probable loss to third parties and the Government resulting from their space activities. This is capped at $500 million for losses to third parties and $100 million for losses to the Government.[72] Claims above this amount may be paid by the United States Government up to a statutory maximum of $1.5 billion above the liability or financial responsibility amount (or maximum available insurance), unless the claims resulted from wilful misconduct by the licence-holder.[73] In addition, any agreement between the National Aeronautics and Space Administration of the United States and a user of a space vehicle may provide that the United States Government will indemnify the user against claims (including reasonable expenses of litigation or settlement) by third parties for death, bodily injury or loss of or damage to property resulting from activities carried on in connection with the launch, operations or recovery of the space vehicle, but only to the extent that such claims are not compensated by liability insurance of the user, provided that indemnification may be limited to claims not resulting from the actual negligence or wilful misconduct of the user.[74]

H. Liability agreements, including cross-waivers of liability

28. According to article V, paragraph 1, of the Liability Convention, whenever two or more States

jointly launch a space object, they shall be jointly and severally liable for any damage caused. As noted by article V, paragraph 2, of the Liability Convention, participants in a joint launching may conclude agreements to apportion financial obligation. This is without prejudice to the right of a State sustaining damage to seek the entire compensation due under the Convention from any or all of the launching States that are jointly and severally liable. Many liability agreements do not apply if the liability arose from wilful or sometimes from negligent conduct. Examples of liability agreements include the following:

(a) The liability regime of the European Space Agency (ESA) is governed by the resolution of the Council on the Agency's legal liability. Under article A-I of the resolution, the Agency is required to indemnify member States and States participating in its space programmes or activities against liability incurred by them as a result of the execution of such programmes or activities, if the Agency so agrees or if the State is held liable as a "launching State" under the Liability Convention. On the other hand, a State, in particular if it is designated as the "launching State" with respect to those activities, must refund to the Agency the amount of compensation charged to the Agency if the damage resulted from gross negligence or a deliberate act or omission on the part of that State or persons acting on its behalf.[75] Article A-II, paragraph 2, of the resolution states that, where a claim for compensation is addressed to a member State or a State participating in a programme of the Agency, that State shall consult the Agency without delay and the Agency may join in the proceedings if the applicable law so permits and may substitute itself for the State involved if the State so requests. In addition, any member State or participating State may join the State involved or the Agency in the proceedings if the applicable law so permits and any State involved shall follow the directives jointly agreed between the Agency and that State both in respect of proceedings and settlement. A member State or a State participating in a programme shall always present its claim for compensation firstly to the Agency. Expenditures of the Agency with respect to compensation for damage are charged to the States participating in the programme concerned, irrespective of any ceiling agreed upon with respect to their participation in the programme. Contributions by States are proportionate to their financial contributions to the programme on the date when the damage occurred, if it occurred during the programme, or on the date of termination of the programme if the damage occurred after that date. Where the risk is covered by insurance, the corresponding premium is charged to the programme;[76]

(b) The same resolution of the ESA Council also governs contracts to be established between ESA and launch service customers. ESA is required to ensure that, when it performs a launching service, the beneficiary takes out an insurance policy covering its own and ESA's liability for damage that may result from the service. However, unless the Council unanimously decides otherwise, ESA should remain liable for any damage resulting from gross negligence or a deliberate act or omission on its own part or on the part of persons in its service;[77]

(c) A 1988 memorandum of agreement governing liability between China and the United States with respect to certain satellite launches stated that, as between the parties, China would assume and compensate the United States for any and all amounts that the United States might be liable under the Liability Convention, the Outer Space Treaty or other applicable international law. The United States was required to notify China of any claim against the United States as soon as practicable after receiving notice and was not permitted to make any settlement without full consultation with the Government of China. If China objected to the terms of any settlement, it was not obligated to compensate the United States unless the United States submitted the claim to a claims commission whose procedures accorded with the procedures in articles XIV–XX of the Liability Convention; in that case, China was required to compensate the United States up to the amount recommended by the claims commission. China was required to provide the United States, on request, with all information and cooperation necessary for the defence of any claim against the United States;[78]

(d) In order to define clearly the respective liabilities of the parties concerning the 1990 launch of the ASIA-I satellite for Hong Kong from China, a liability agreement was entered into between the Governments of China and the United Kingdom. Under the agreement, China was liable for damages under international law to third countries or their people during the launch phase of the satellite, from ignition

to separation of the satellite from the launch vehicle. The United Kingdom was liable during the satellite's flight and operation after successful launch. This agreement has been invoked many times in China's subsequent commercial launch services for international customers;

(e) Under a 1993 agreement between the French Government and ESA concerning the Guiana Space Centre, ESA agreed to hold the French Government harmless from any claims made against it in respect of loss or damage by reason of the use of the Guiana Space Centre facilities for the purposes of ESA's Ariane development programme. The French Government agreed to hold the Agency and its member States harmless from claims made for damage by reason of the execution at the Guiana Space Centre of launch activities by the Ariane space company or by persons in its service, unless the damage was caused during launch of an ESA satellite, in which case a different liability arrangement applied. Both hold-harmless agreements would not apply if the loss or damage arose from gross negligence or a wilful act or deliberate omission by the other party (and related persons);[79]

(f) Under a 1995 agreement between ESA, Italy and Kenya concerning the establishment and operation of ESA equipment in Malindi, Kenya, the parties agreed that Kenya would not be held liable, at either the national or the international level, through the activities of ESA on its territory, for acts or omissions by ESA or persons designated by it acting or failing to act within the limits of their duties. If Kenya's international liability was nevertheless involved, Kenya had a right of recourse against ESA, except where the involvement was due to gross negligence, an act or deliberate omission of the Government of Kenya or a person acting on its behalf. ESA also agreed to hold Kenya harmless in the event of any suit, action or claim relating to activities at the Malindi station, unless the injuries or damage were due to gross negligence, an act or deliberate omission of the Government of Kenya or a person acting on its behalf.[80]

29. One type of liability agreement is a "cross-waiver of liability", through which partners in a space mission agree not to seek recovery of damage from each other. Partners may assume responsibility for their own property loss and property loss or personal injury to their employees resulting from the activity in question. As in the case of other liability agreements, many cross-waivers of liability do not apply if the liability was caused by wilful or sometimes by negligent conduct.

30. A cross-waiver of liability is a requirement to obtain a launch or re-entry licence in the United States. One purpose of a cross-waiver of liability requirement may be to encourage space ventures by lowering litigation and insurance costs, since each party agrees up front to assume responsibility for specified damage it may sustain.[81] Cross-waivers of liability are frequently contained in international agreements governing space missions, such as the International Space Station Agreement, and launch service agreements. Examples include:

(a) In order to obtain a launch or re-entry licence in the United States from the Federal Aviation Administration, the licensee must make a reciprocal waiver of claims with its contractors, subcontractors and customers, and contractors and subcontractors of the customers, involved in launch services or re-entry services under which each party to the waiver agrees to be responsible for property damage or loss it sustains or for personal injury to, death of or property damage or loss sustained by its own employees resulting from an activity carried out under the applicable licence;[82]

(b) Under a 1989 agreement between ESA and CNES on the execution of the Ariane-5 development programme, each party agreed to bear the cost of compensation for damage or injury of any kind sustained by its personnel as a result of activities within the framework of the agreement, even where the other party is responsible for such damage or injury, except in the event of gross negligence by the other party or its personnel. Each party also agreed to guarantee the other against claims and legal actions brought by the victim, his heirs or the social security system concerned. Finally, this agreement applied to damage caused by the personnel of the parties to the property of the parties themselves;[83]

(c) The International Space Station Agreement includes a cross-waiver of liability between the partners. The cross-waiver of liability extends to other partner States, related entities of partner States and employees of any of those entities. The cross-waiver applies to all "protected space operations", defined as all launch vehicle activities, Space Station activities

and payload activities on Earth, in outer space or in transit between Earth and outer space in implementation of the International Space Station Agreement, memoranda of understanding and implementing arrangements. Various examples of "protected space activities" are given in the Agreement. The cross-waiver of liability applies to any claims for damage, whatever their legal basis. The cross-waiver is not applicable to (a) claims between a Partner State and its related entity or between its own related entities; (b) claims made by a natural person, his or her estate, survivors or subrogees (except when a subrogee is a partner State) for bodily injury to, or impairment of health of, or death of such natural person; (c) claims for damage caused by wilful misconduct; (d) intellectual property claims; or (e) claims for damage resulting from a failure of a partner State to extend the cross-waiver of liability to its related entities. Each partner State is responsible, by contract or otherwise, for extending the cross-waiver of liability to its related entities.[84]

I. Registration of launches

31. Provisions of the Registration Convention, the Outer Space Treaty and General Assembly resolution 1721 (XVI) B governing the registration of launches involving international cooperation are summarized in paragraph 6 above.

32. Some national laws and international agreements contain provisions concerning international responsibilities for registration of space objects launched into outer space. For example:

(a) Article 5 of the Russian Statute on Licensing Space Operations lists as a requirement for a launching licence the applicant's guarantee that foreign satellite equipment put into orbit by Russian launch facilities will be entered in the national register of the equipment's proprietor nation;[85]

(b) Section 4 of the Swedish Decree on Space Activities states that the national register is for launches for which Sweden is considered the launching State in accordance with article 1 of the Registration Convention. If, in addition to Sweden, another State may also be considered a launching State, the space object should be registered in Sweden only if this has been agreed between the States concerned;[86]

(c) Article 5 of the International Space Station Agreement states that each partner shall register as space objects the flight elements listed in the annex that it provides, the European partner having delegated this responsibility to ESA, acting in its name and on its behalf. Each partner shall retain jurisdiction and control over the elements it registers, above and over personnel in or on the Space Station who are its nationals.[87]

33. Space transport vehicles, in particular stages that may remain in orbit after the launch, are often registered separately from the space objects they deliver into orbit:

(a) Categories of space object frequently registered by the United States include "Spacecraft engaged in practical applications and uses of space technology such as weather or communications" and "Spent boosters, spent manoeuvring stages, shrouds and other non-functional objects" (see, for example, ST/SG/SER.E/379 and ST/SG/SER.E/385);

(b) For Ariane launches from French Guiana, the satellite is often registered by one country whereas parts of the launch vehicle that remain in orbit are registered by France. For instance, for a launch on 4-5 September 1999, the satellite, MuKungHwa-3 was registered by the Republic of Korea (ST/SG/SER.E/362), whereas the third stage of the Ariane-4 rocket was registered by France (ST/SG/SER.E/374). The launch on 2-3 April 1999 of INSAT-2E was registered by India (ST/SG/SER.E/357), whereas the third stage of the Ariane-4 rocket was registered by France (ST/SG/SER.E/374).[88]

34. On the other hand, information on other registered space objects frequently contains a reference to the vehicle on which the space object was launched, even if the launch vehicle itself is not registered.[89]

35. At present, the only reusable space vehicle is the United States Space Shuttle. Separate missions of the Space Shuttle are registered separately with the United Nations.[90] The date of launch for satellites launched by the Space Shuttle is normally listed as the take-off date of the Shuttle.[91] In the case of the launch of SAC-A by the Space Shuttle Endeavour, the date of launch was listed as the date of separation between the space object and the Space Shuttle (ST/SG/SER.E/351).

36. Some States have transferred the State of registry of a satellite in orbit:

(a) Satellites AsiaSat-1, AsiaSat-2, APSTAR-I and APSTAR-IA were launched from China and registered with the United Nations by the United Kingdom (ST/SG/SER.E/222, ST/SG/SER.E/300 and Corr.1 and ST/SG/SER.E/316). On 1 January 1997, the State of registry of these satellites was changed from the United Kingdom to the Hong Kong Special Administrative Region of China. This change was probably associated with a transfer of territory. Both China and the United Kingdom informed the United Nations of this change in the State of registry. (ST/SG/SER.E/333 and ST/SG/SER.E/334).

(b) The satellite BSB-1A was originally registered with the United Nations by the United Kingdom (ST/SG/SER.E/219), following its launch from the United States in 1989. Subsequently, it was listed as Sirius 1 on the Swedish register of objects launched into outer space, which was conveyed to the United Nations in ST/SG/SER.E/352, following purchase of the satellite in orbit in 1996.

J. International organizations

37. Under the Liability and Registration Conventions, certain provisions are deemed to apply to any international intergovernmental organization that conducts space activities if the organization declares its acceptance of the rights and obligations provided for in the Convention and if a majority of the States members of the organization are parties to the convention in question and to the Outer Space Treaty.[92] As at 1 January 2001, ESA and the European Telecommunications Satellite Organization (EUTELSAT)[93] had declared their acceptance of the rights and obligations provided for in the Liability Convention. As at the same date, ESA and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) had declared their acceptance of the rights and obligations provided for in the Registration Convention. Several international organizations own or operate space objects. ESA also owns launch facilities: the Guiana Space Centre, located in French Guiana.

III. Issues identified by States and international organizations regarding the application of the concept of the "launching State"

38. The following section summarizes issues identified by various States and international organizations during discussion of the agenda item "Review of the concept of the 'launching State'" by the Legal Subcommittee in 2000 and 2001, as well as other information submitted to the Secretariat.

39. Some countries have expressed the view that new developments in space activities, such as increasing commercialization of space activities, have given rise to a number of questions regarding the application of the concept of the "launching State" under the Liability and Registration Conventions, as well as the application of other terms in the United Nations treaties and principles on outer space, including "territory", "facility", "State which launches" and "procures" (in art. I of the Liability and Registration Conventions), "responsible for" (in art. 6 of the Rescue Agreement) and "exercises jurisdiction and control" (in principle 2 of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space) (A/AC.105/763, annex II, para. 16).

40. On the other hand, the view has been expressed that no adverse effects have resulted from any asserted ambiguity in the definition of the "launching State" and that both States and private ventures have continued to conduct launches notwithstanding any possible ambiguities (A/AC.105/763, annex II, para. 30). Similarly, the view has been expressed that the Legal Subcommittee should focus on how committed States are to implementing the concept of the launching State, rather than on how it can be improved.

41. Views expressed and questions raised by States and international organizations are summarized below.

A. Issues relating to territories and facilities

42. Some countries have expressed the view that the State or States providing launch services should not be liable for damage caused by a payload after the payload has been placed successfully into the proper

orbit. Thereafter, in the view of those countries, the State or States that own or operate the payload should be liable for damage caused by it (A/AC.105/763, annex II, para. 17).

43. Some countries have noted that the concept of the "launching State" does not refer expressly to the possibility of launching space objects from airspace or the high seas. The difficulty of identifying a launching State in such cases may create a lacuna in application of the Liability and Registration Conventions (A/AC.105/763, annex II, paras. 20 and 21). Legal ties such as jurisdiction or flag State may be less reliable and can sometimes be chosen by entrepreneurs, which may lead to the use of flags of convenience.

44. One international organization considered it necessary to develop legal rules governing relations between the State from whose territory a launch takes place and the State from whose facility the launch takes place, to ensure compliance with rules on protection of the environment and the safety of persons and goods, among other things. It may also be necessary for provisions to extend to the execution of launches and control over the operator and payload.

45. What type or level of property interest should a State have in a "facility" before it can become a "launching State"?

46. Does a launch by an aircraft begin when the aircraft takes off or when the spacecraft separates from the aircraft?

B. States procuring the launch of a space object

47. Under the Liability and Registration Conventions, a State "procuring the launch of a space object" is a launching State. What does "procuring" mean and who falls into the category of "procurers of a launch"? Does "procurement" imply that the State has paid for or obtained a benefit from the launch or does it imply that the State has organized the launch?

48. One example raised by presentations to the Scientific and Technical Subcommittee and to the Legal Subcommittee is that of a "delivery in orbit" arrangement. Under such an arrangement, a supplier from country A builds a satellite and arranges for launch by means of a launch service provider from country B for a satellite operator from country C. The supplier from country A may retain operational control over and property ownership of the satellite until it has become clear that the launch is successful and the satellite can be operated successfully. At that point, operational control and title may transfer to the satellite operator from country C. The supplier from country A and the satellite operator from country C would typically be parties to the satellite procurement or satellite systems contract. The supplier from country A and the launch service provider from country B would typically be parties to the launch service agreement. The supplier from country A has privity of contract with the launch service provider and has entered into a contract to arrange the launch and deliver the satellite into its designated orbital position. The satellite operator from country C may also have control over the choice of launch service provider and may determine that based on cost. Which States would be launching States under this example?

49. Some concerns were raised about possible adverse effects if several countries are classified as "launching States" for a particular launch:

(a) Business may be faced with the burden of regulation, or "red-tape costs", in several States for the launch of a single space object;

(b) In order to cover potential international liability, each State procuring the launch of a space object is likely to set insurance requirements for the entity carrying out the launch. This may be problematic in the case of procuring States, since they may have limited access to information on the launch technology and may therefore find it difficult to quantify reasonable risks, may see little benefit in encouraging launch activities and may have limited ability to supervise the launch.

C. Fault

50. For damage caused elsewhere than on the surface of the Earth, the launching State is liable only if the damage is due to its fault or the fault of persons for whom it is responsible (Liability Convention, art. III).

51. Is it possible that the party at fault with respect to certain damage would not be a launching State and, if so, on what basis could the party at fault be liable?

52. What criteria would be used for assessment of fault when two satellites collide? What are the "rules of the road" for space? Is it relevant, for instance, whether the satellites have propulsion systems?

D. Reusable launch vehicles

53. Should multiple launches of a reusable launch vehicle be considered separate launches under the Liability and Registration Conventions?

E. Jurisdiction and control, and supervision of nationals

54. Is jurisdiction and control over the relevant phase of the launch or space activity relevant to whether a State is a "launching State"?

55. Which States are launching States when ownership or control over a satellite is transferred from one State to another? Can a State that was not a launching State when a satellite was launched become a launching State at a later stage?

56. Is there a possibility that some States may not be able to provide effective, continuing supervision or control over activities of their nationals who have launched or procured the launch of a space object but might be outside the State's jurisdiction (A/AC.105/763, annex II, para. 18)?

F. International organizations

57. Which States are launching States with respect to satellites launched by international organizations when those organizations have not declared acceptance of the rights and obligations in the Liability and Registration Conventions and/or when the organizations are in the process of becoming private companies?

G. Remote ground stations

58. Is a private remote ground station operator carrying out activity in outer space (by operating a space object) for which the State would have international responsibility under article 6 of the Outer Space Treaty? This may be relevant when commands are sent from a control centre in country A via private leased circuits to a ground station in country B. Does the answer depend on the particular satellite control practice employed? Control practices may include the following:

(a) A control centre sends commands in their binary form, as acted upon by the satellite, via a remote ground station. The ground station modulates those commands onto a radio frequency carrier and transmits them to the intended satellite. The control centre also sends electronic commands to the ground station. The control centre also commands tracking and ranging activities;

(b) As for case (a), but staff at the control centre instruct those at the ground station to initiate pointing and ranging activities;

(c) As for case (a), except the automated system at the ground station may accept or deny a request from the control centre to uplink commands due to prioritizing other customers;

(d) As for case (a), except the ground station receives token requests for commands (e.g. "send command TC123"), which it matches against a locally maintained database and then sends the appropriate binary sequence;

(e) All requests for satellite commanding are carried out by paper-based or verbal instruction from the control centre. The ground station staff then type in the commands and transmit them. Reports of satellite health are made by sending printouts from the ground station to the control centre.

In all cases, the responsibility for getting part of the process right could lie with the ground station. The various examples could fail as a result of inadequate design (case (a)), competing demands (case (c)), poor database update coordination (case (d)) or human error (cases (b) and (e)). Are the following factors relevant considerations: (a) does the system generate and issue commands? (b) Who has discretion at the level of assessing issues such as satellite health and collision risk and its implications for prioritizing resources to one activity or another? (c) Who has responsibility for approving installation design, implementation and operation with the knowledge of how the performance in these areas can affect the outcome in orbit? and (d) the contractual arrangements between collaborating parties?

59. Does the "control" in "telemetry, tracking and control" represent the key function in the operation of a space object? If so, does the remote ground station operator's protocol conversion equipment in case (a) above, for example, facilitate the operation of the satellite to any greater degree than the private leased circuit between country A and country B supplied by the international telecommunications operator?

IV. Elements that could be included in national space legislation and licensing regimes

60. The following is a list of elements that, depending on the space activities in the country concerned, could be included in national legislation and licensing regimes for space activity:

(a) National space programme

(i) Identification of policy goals and activities of the national space programme;

(ii) Establishment/identification and financing of government institutions responsible for carrying out or supervising space activities;

(iii) Human resource development, from basic science education to training of space explorers;

(iv) Measures to encourage private space industry, if this is a national policy, possibly including private participation in government projects, a cross-waiver of liability requirement or financial incentives. Payment of claims exceeding liability insurance amounts, considered under (e) (iii) below, may also further a policy of encouraging private space industry;

(b) Authorization and continuing supervision of space activities

(i) Requirement for non-governmental entities and possibly governmental entities to obtain authorization (such as a licence) from designated government institutions before carrying out activities in outer space. This may apply, among other things, to activities in outer space carried out by nationals and to activities carried out from national territory. It may incorporate a more detailed definition of space activities that must be authorized. Requirements and governmental institutions designated for authorizing space activities may differ significantly for activities carried out by governmental versus non-governmental entities;

(ii) Entities carrying out activities in outer space may be required to provide the Government with information on the space activities, including appropriate updates. For certain space activities, provisions for inspection and monitoring of space activities by designated government officials, including requirements to permit appropriate access to facilities and technical information;

(iii) Provisions outlining the general content of authorizations for space activity and the conditions on which they may be granted. The national space law may also include penalty provisions, for instance for failure to comply with conditions of an authorization, which may include revocation or suspension of the authorization;

(c) Ensuring the safety of space activity

(i) Establishment of safety and environmental standards for space activities that may cause damage to human health, property or the environment, as well as procedures for responding to and investigating accidents. These may include standards for debris mitigation (such as reorbit/deorbit requirements). An example of a basic standard is that a person be competent to carry out the activity concerned;

(ii) Provisions for technical review of proposed space activities, which may be part of the process for authorizing the space activity in question. In addition, the national law could include provisions for certifying launch facilities and certain space technologies, such as launch vehicles. It should be noted that, if the national law includes insurance requirements, insurance companies are also likely to carry out a technical review of the space activities they are insuring;

(iii) Provisions implementing the Principles Relevant to the Use of Nuclear Power Sources in Outer Space;

(iv) Public access to safety assessments, including safety assessments for nuclear power sources;

(v) Coordinating space activities with rules for the safety of air and maritime traffic;

(vi) Public notification, search and rescue, clean-up and investigation of accidents;

(d) Registration

(i) Establishment of a national registry of objects launched into outer space, in accordance with provisions of the Registration Convention, including identification of the government authority responsible for maintaining the registry;

(ii) Establishment of mechanisms for coordinating registration of space objects with other launching States, under article II, paragraph 2, of the Registration Convention;

(iii) Provisions for providing information to the United Nations under article IV of the Registration Convention;

(e) Liability, insurance/financial responsibility requirements and indemnification

(i) Establishment of a liability regime for space activities that create a risk of damage to third parties;

(ii) Establishment of liability insurance or financial responsibility requirements for space activities that create a risk of damage to third parties and may create a risk of liability for the Government, or other mechanisms to ensure that victims of damage actually receive compensation. This may include the determination of maximum levels of damage that are likely to be caused by the space activity in question;

(iii) For activities that create a risk of liability for the Government under the Liability Convention, the law may create a mechanism for the Government to recover damages paid to other States under the Liability Convention from the entity causing the damage;

(iv) Provisions for payment of claims exceeding liability insurance amounts, for instance by the Government;

(f) Other subjects

(i) Implementation of United Nations treaties and principles on outer space;

(ii) Property interests in space objects, possibly including a system for registering interests in space property;

(iii) Financing of space property, possibly including provisions governing payment of debts;

(iv) Intellectual property;

(v) National security, foreign policy and ensuring compliance with other international obligations;

(g) International aspects of national space legislation

(i) Coordinating authorization and supervision of space activities with other States whose nationals may be participating and coordinating licensing of launches with other potential launching States;

(ii) There may be value in harmonizing aspects of national space legislation between countries on issues such as licensing procedures and calculation of maximum forseeable risk.

Notes

[1] See *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. II, para. 386.

[2] Commercial Space Transportation Quarterly Launch Report (3rd Quarter 2001), United States Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, Washington, D.C., pp. 8 and 9.

[3] Australian Space Activities Act (No. 123, 1998), sects. 8 and 11-15.

[4] Russian Federation Law on Space Activity (Federal Law No. 5663-1 of 20 August 1993, as amended by Federal Law No. 147-F3 of 29 November 1996), art. 9.

[5] Ibid., art. 2.

[6] South African Space Affairs Act (No. 84 of 1993), sects. 1 and 11.

[7] Swedish Act on Space Activities (1982: 963), sect. 1.

[8] Ordinance of the Supreme Soviet of Ukraine on Space Activity (Law No. 503/96-VR of 15 November 1996), arts. 1 and 10.

[9] United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 1.

[10] Ibid., art. 13.

[11] 49 United States Code, sect. 70104.

[12] Delegated to the Associate Administrator for Commercial Space Transportation of the Federal Aviation Administration.

[13] 49 United States Code, sect. 70102.

[14] 47 United States Code of Federal Regulations 25.102.

[15] 15 United States Code, sect. 5622. Remote sensing licences are issued by the Secretary of Commerce under 15 United States Code, sect. 5621.

[16] Australian Space Activities Act (No. 123, 1998), sect. 11; South Africa Space Affairs Act (No. 84 of 1993), sect. 11; Swedish Act on Space Activities (1982: 963), sect. 2; Ordinance of the Supreme Soviet of Ukraine on Space Activity (Law of Ukraine of 15 November 1996), art. 10; and 49 United States Code, sect. 70104(a)(1)

[17] Australian Space Activities Act (No. 123, 1998), sect. 8.

[18] Ibid., sects. 8 and 12.

[19] Ibid., sects. 26 and 35.

[20] Russian Federation Law on Space Activity (Federal Law No. 5663-1 of 20 August 1993, as amended by Federal Law No. 147-F3 of 29 November 1996), art. 9.

[21] South African Space Affairs Act (No. 84 of 1993), sect. 11.

[22] Swedish Act on Space Activities (1982: 963), sect. 2.

[23] Ordinance of the Supreme Soviet of Ukraine on Space Activity (Law No. 503/96-VR of 15 November 1996), art. 10.

[24] United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 2

[25] 49 United States Code, sect. 70102, para. 1.

[26] Ibid., sect. 70104.

[27] Agreement among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation and the Government of the United States of America concerning Cooperation on the Civil International Space Station (20 January 1998), art. 5.

[28] Ibid., art. 22.

[29] Agreement among the Government of the Republic of Kazakhstan, the Government of the Russian Federation and the Government of the United States of America on Technology Safeguards Associated with the Launch by Russia of U.S. Licensed Spacecraft from the Baikonur Cosmodrome (26 January 1999), arts. II, para. 7 and 9, III, para. 4, and V, para. 2.

[30] Australian Space Activities Act (No. 123, 1998), sects. 18 (e), 26, para. 3 (g), 35, para. 2 (c) and 43, para. 3 (e); Russian Federation Statute on Licensing Space Operations (Federal Government Decree No. 104 of 2 February 1996), art. 24 (d); South Africa Space Affairs Act (No. 84 of 1993), sect. 11, para. 2; United Kingdom Outer Space Act 1986 (1986 Chapter 38), arts. 4, para. 2 and 5, para. 2 (e); 15 United States Code, sect. 5622 (b), para. 1, and 49 United States Code, sects. 70104 (c), 70105 and 70116.

[31] Australian Space Activities Act (No. 123, 1998), sect. 59; Australian Space Activities Regulations 2001 (Statutory Rules 2001, No. 186), Part 9; Russian Federation Statute on Licensing Space Operations (Federal Government Decree No. 104 of 2 February 1996), arts. 28–31; and United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 4, para. 3 (d).

[32] Australian Space Activities Act (No. 123, 1998), sects. 18 and 26.

[33] Ibid., sects. 18 and 20.

[34] Ibid., sects. 26 and 29.

[35] Ibid., sects. 50–58.

[36] Australian Space Activities Regulations 2001 (Statutory Rules 2001, No. 186).

[37] Russian Federation Law on Space Activity (Federal Law No. 5663-1 of 20 August 1993, as amended by Federal Law No. 147-F3 of 29 November 1996), art. 22.

[38] Russian Federation Statute on Licensing Space Operations (Federal Government Decree No. 104 of 2 February 1996), art. 5 (h).

[39] Russian Federation Law on Space Activity (Federal Law No. 5663-1 of 20 August 1993, as amended by Federal Law No. 147-F3 of 29 November 1996), art. 24.

[40] South Africa Space Affairs Act (Act No. 84, 1993), sect. 11.

[41] Ibid., sect. 10.

[42] Ibid., sect. 22 (d).

[43] Ordinance of the Supreme Soviet of Ukraine on Space Activity (Law No. 503/96-VR of 15 November 1996), art. 9.

[44] Ibid., arts. 20 and 21.

[45] Ibid., art. 23.

[46] United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 4.

[47] Ibid., art. 5.

[48] 49 United States Code, sect. 70105.

[49] Ibid., sect. 70106.

[50] Australian Space Activities Act (No. 123, 1998), sects. 25, 34 and 41; Russian Federation Statute on Licensing Space Operations (Federal Government Decree No. 104 of 2 February 1996), art. 25; South Africa Space Affairs Act (Act No. 84 of 1993), art. 13; Swedish Act on Space Activities (1982: 963), sect. 4; United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 6; and 49 United States Code, sect. 70107.

[51] Australian Space Activities Act (No. 123, 1998), sects. 30 and 80–83; Canadian Aeronautics Act, Chapter A-2, sects. 7.3-8.7; Russian Federation Law on Space Activity (Federal Law No. 147-F3 of 29 November 1996), art. 29; South Africa Space Affairs Act (Act No. 84, 1993), sect. 23; Swedish Act on Space Activities (1982: 963), sect. 5; Ordinance of the Supreme Soviet of Ukraine on Space Activity (Law of Ukraine of 15 November 1996), art. 29; United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 12; and 49 United States Code, sect. 70115.

[52] Agreement among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station (20 January 1998), art. 22.

[53] Australian Space Activities Act (No. 123, 1998), sects. 66–71; and Russian Federation Law on Space Activity (Federal Law No. 147-F3 of 29 November 1996), arts. 25 and 30.

[54] Australian Space Activities Act (No. 123, 1998), sects. 84–103; Russian Federation Law on Space Activity (Federal Law No. 147-F3 of 29 November 1996), art. 23; and South Africa Space Affairs Act (Act No. 84, 1993), sect. 15.

[55] Australian Space Activities Act (No. 123, 1998), sects. 29 and 35.

[56] Ibid., sect. 47.

[57] Ibid., sect. 48. Further details about financial responsibility and insurance requirements can be found in the Space Activities Regulations 2001 (Statutory Rules 2001, No. 186), as well as in the Maximum Probable Loss Methodology (Department of Industry, Science and Resources, 18 June 2001).

[58] Law Concerning the National Space Development Agency of Japan (Law No. 50 of 23 June 1969, as amended, the "NASDA Law"), art. 24, para. 2.

[59] Russian Federation Law on Space Activity (Federal Law No. 5663-1 of 20 August 1993, as amended by Federal Law No. 147-F3 of 29 November 1996), art. 25.

[60] Russian Federation, Statute on Licensing Space Operations (Federal Government Decree No. 104 of 2 February 1996), art. 24 (b).

[61] South Africa Space Affairs Act (Act No. 84, 1993), sect. 14.

[62] Ordinance of the Supreme Soviet of Ukraine on Space Activity (Law No. 503/96-VR of 15 November 1996), arts. 24 and 25.

[63] United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 5, para. 2 (f).

[64] 49 United States Code, sect. 70112.

[65] Australian Space Activities Act (No. 123, 1998), sects. 69 and 74.

[66] NASDA Law, art. 24, para. 3.

[67] Russian Federation Law on Space Activity (Federal Law No. 5663-1 of 20 August 1993, as amended by Federal Law No. 147-F3 of 29 November 1996), art. 30.

[68] South Africa Space Affairs Act (Act No. 84, 1993), sect. 14, para. 1 (b).

[69] Ibid., sect. 14, para. 2 (a).

[70] Swedish Act on Space Activities (1982: 963), sect. 6.

[71] United Kingdom Outer Space Act 1986 (1986 Chapter 38), art. 10.

[72] 49 United States Code, sect. 70112.

[73] Ibid., sect. 70113.

[74] 42 United States Code, sect. 2458b.

[75] ESA/C/XXII/Res.3, 13 December 1977, art. A-I.

[76] Ibid., arts. A-II and A-III.

[77] Ibid., arts. B-I, para. 2, and B-II.

[78] Memorandum of Agreement on Liability for Satellite Launches between the Government of the United States of America and the Government of the People's Republic of China (17 December 1988).

[79] Agreement between the French Government and the European Space Agency concerning the Guiana Space Centre (29 November 1993), art. 11.

[80] Protocol between the European Space Agency, the Government of the Republic of Italy and the Government of the Republic of Kenya on the setting up and operation of European Space Agency equipment within the perimeter of the San Marco Satellites Tracking and Launching Station in Malindi, Kenya, and on the cooperation between the Government of the Republic of Kenya and ESA for peaceful purposes (13 September 1995), art. 10.

[81] See, for example, *NASA Space Act Agreements Manual*, p. 17 (NASA Procedures and Guidelines 1050.1, 30 December 1998). Note that United States commercial launches are authorized not by the National Aeronautics and Space Administration but by the Federal Aviation Administration, as described in subparagraph (a).

[82] 49 United States Code, sect. 70112(b).

[83] Agreement between the European Space Agency and the Centre national d'études spatiales on the Execution of the Ariane-5 Development Programme (3 October 1989), art. 13.

[84] Agreement among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station (20 January 1998), art. 16.

[85] Russian Federation, Statute on Licensing Space Operations (Federal Government Decree No. 104 of 2 February 1996), art. 5.

[86] Sweden, Decree on Space Activities (1982: 1069), sect. 4

[87] Agreement among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station (20 January 1998), art. 5.

[88] Dates of registration for the satellites and the launch vehicles referred to in this paragraph differ presumably because of the different time zones of the countries registering the space objects.

[89] See, for example, information provided by the Russian Federation, such as ST/SG/SER.E/363, ST/SG/SER.E/367, ST/SG/SER.E/370, ST/SG/SER.E/372, ST/SG/SER.E/384 and ST/SG/SER.E/387.

[90] For instance, the first four flights of the Space Shuttle Columbia were registered as a "reusable space transportation system" in ST/SG/SER.E/52, ST/SG/SER.E/63, ST/SG/SER.E/67 and ST/SG/SER.E/68.

[91] Registration of the following satellites refers to the same launch date as the Space Shuttle on which the satellites were launched: ANIK C-3 on 11 November 1982 (ST/SG/SER.E/75 and ST/SG/SER.E/109); ANIK C-2 on 18 June 1983 (ST/SG/SER.E/96 and ST/SG/SER.E/156); ANIK D-2 on 8 November 1984 (ST/SG/SER.E/122 and ST/SG/SER.E/137); ANIK C-1 on 12 April 1985 (ST/SG/SER.E/134 and ST/SG/SER.E/156); MORELOS I on 17 June 1985 (ST/SG/SER.E/134 and ST/SG/SER.E/184); MORELOS II on 27 November 1985 (ST/SG/SER.E/143 and ST/SG/SER.E/184); ULYSSES on 6 October 1990 (ST/SG/SER.E/250 and ST/SG/SER.E/266); and EURECA 1 on 31 July 1992 (ST/SG/SER.E/260 and ST/SG/SER.E/266). The registration for INSAT-1B lists both the date of launch of the Space Shuttle and the date of deployment of the satellite (ST/SG/SER.E/091).

[92] Liability Convention, art. XXII; Registration Convention, art. VII.

[93] It is possible that EUTELSAT is no longer an "international intergovernmental organization" within the meaning of the Liability and Registration Conventions.